AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1-95. (Canceled)

96. (Currently Amended) ~~Electrical~~ Electrically assisted catalytic ohmic heating reactor for reforming a gas, the gas comprising at least one possibly substituted hydrocarbon, and/or at least one possibly substituted organic compound, containing carbon atoms and hydrogen as well as at least one heteroatom, in the presence of an oxidizing gas;

said electrically assisted catalytic ohmic heating reactor including:

- an enclosure;
- a reaction chamber provided with at least two electrodes and disposed inside the enclosure, said reaction chamber comprising at least one porous conductive ~~filling~~ lining material which defines as a whole or in part a reforming catalyst, the conductive ~~filling~~ lining material being electrically insulated from a metal wall of the enclosure so as to prevent any short-circuit;
- at least one gas to be reformed supply duct;
- at least one oxidizing gas supply duct, that is distinct or not from the gas to be reformed supply duct;
- at least one reformed gas outlet; and

- an electrical source adapted to power up the electrodes in order to generate an electronic flux in the conductive ~~filling~~ lining material between the electrodes.

97. (Currently Amended) A reactor according to claim 104, wherein said ~~filling~~ conductive lining material is an iron or iron alloy.

98. (Previously Presented) Reactor according to claim 96, in which the reaction chamber is of parallelepiped shape or cylindrical.

99. (Withdrawn) Reactor according to claim 96, in which at least one of the electrodes is of hollow type and constitutes an inlet port of the gas to be reformed.

100. (Withdrawn) Reactor according to claim 96, in which at least one of the electrodes is of hollow type and constitutes a gas to be reformed supply duct and an oxidizing gas supply duct.

101. (Withdrawn) Reactor according to claim 96, in which at least one of the electrodes is of hollow type and constitutes the outlet for the gases from reforming.

102. (Withdrawn) Reactor according to claim 96, in which at least two of the electrodes are disposed opposite one another.

103. (Currently Amended) Reactor according to claim 96, comprising at least two metal electrodes each consisting of a tubular member and a hollow perforated

disk, one disk being located at the end of gas to be reformed supply duct, said duct opens into the reaction chamber and wherein said disk is in contact with the ~~filling~~ conductive lining material of the reaction chamber to ensure electrical current supply to the ~~filling~~ conductive lining material.

104. (Currently Amended) Reactor according to claim 96, in which the conductive ~~filling~~ lining material is selected from the group consisting of elements of group VIII of the periodic table (CAS numbering) and alloys containing at least one of said elements.

105. (Withdrawn - Currently Amended) Reactor according to claim 96, in which the ~~filling~~ conductive lining material consists of balls and/or threads based on at least one element of group VIII or on at least one metal oxide.

106. (Withdrawn - Currently Amended) Reactor according to claim 97, in which the ~~filling~~ conductive lining material consists of balls and/or threads based on iron or steel.

107. (Previously Presented) Reactor according to claim 96, in which the material, in dense state, has an electrical resistivity at 20 °C that is between 50×10^{-9} and 2000×10^{-9} ohm-m.

108. (Currently Amended) Reactor according to claim 104, in which the ~~filling~~ conductive lining material is in a form selected from the group consisting of straws,

fibers, filings, frits, balls, nails, threads, filaments, wools, rods, bolts, nuts, washers, chips, powders, granules and perforated plates.

109. (Currently Amended) Reactor according to claim 108, in which the ~~filling~~ conductive lining material comprises perforated plates and the surface percentage of the openings in the plate is comprised between 5 and 40%.

110. (Currently Amended) Reactor according to claim 108, in which the ~~filling~~ conductive lining material is made of soft steel wool.

111. (Currently Amended) Reactor according to claim 103, in which the ~~filling~~ conductive lining material is previously treated to increase at least one of the following characteristics:

- specific surface area;
- purity; and
- chemical activity.

112. (Previously Presented) Reactor according to claim 111, in which the previous treatment is a treatment with a mineral acid and/or a heat treatment.

113. (Currently Amended) Reactor according to claim 108, in which the conductive ~~filling~~ lining material consists of fibers having a characteristic diameter comprised between 25 micrometers and 5 mm, as well as a length higher than 10 times its characteristic diameter.

114. (Currently Amended) Reactor according to claim 96, in which the conductive ~~filling~~ lining material defines a porous medium having a volume surface of more than 400 m^2 of exposed surface per m^3 of reaction chamber.

115. (Previously Presented) Reactor according to claim 96, in which at least one gas to be reformed supply duct is mounted perpendicular to the direction of the electronic flux produced between the electrodes.

116. (Previously Presented) Reactor according to claim 96, in which the reaction chamber is cylindrical and at least one of the gas to be reformed supply duct and/or the oxidizing gas supply duct is disposed tangentially with respect to the cylindrical wall of the reaction chamber.

117. (Previously Presented) Reactor according to claim 96, in which at least one of the at least one reformed gas outlet is disposed in the reaction chamber opposite the gas to be reformed supply duct.

118. (Currently Amended) Reactor according to claim 96, in which the electrical source consists of a current transformer in the case of an electrical supply of alternating current (AC) type or a current rectifier in the case of an electrical supply of the direct current (DC) type, which electrical source has a power that is calculated according to the energy needs of the reforming reactions under consideration and said electrical source having to supply a minimum amperage calculated by the following equation:

$$I_{minimum} = \lambda \cdot F \quad (10)$$

in which:

$I_{minimum}$ is the minimum current to be applied, given in A;

λ is a parameter that depends on the geometry of the reactor, of the type of ~~filling~~ conductive lining material, of the operating conditions and the gas to be reformed; and

F is the molar flow of the gas to be reformed, expressed in mole of gas to be reformed / second,

the parameter λ is established experimentally by varying the current by means of a source of variable amperage (AC or DC) and also by varying the flow of gas to be reformed.

119. (Currently Amended) Reactor according to claim 96, in which the conductive ~~filling~~ lining material has a porosity index comprised between 0.50 and 0.98.

120. (Previously Presented) Reactor according to claim 96, in which the time of residence of the reactants is more than 0.1 second.

121. (Currently Amended) Reactor according to claim 119, in which the ~~filling~~ conductive lining material consists of a wool made of steel threads mixed with spherical materials.

122. (Currently Amended) Reactor according to claim 96, in which in addition to the conductive ~~filling~~ lining material, the reaction chamber contains non conductive and/or semi-conductive and/or electrically insulating materials, the latter being

adequately disposed in the reaction chamber in a manner to adjust the total electrical resistance of the ~~filling~~ conductive lining material.

123. (Previously Presented) Reactor according to claim 103, in which at least one electrode is of the perforated type, and having an opening diameter of more than 25 micrometers, the holes being uniformly distributed according to a density of at most 100,000 openings per cm^2 of electrode surface.

124. (Previously Presented) Reactor according to claim 123, in which the holes are such that the energy loss resulting from gas crossing through the electrode or electrodes is not in excess of 0.1 atmosphere.

125. (Previously Presented) Reactor according to claim 123, in which the openings are distributed at the surface of the perforated electrode so as to provide a uniform diffusion of the gases through the reaction chamber.

126. (Previously Presented) Reactor according to claim 123, in which the size of the openings increases in radial direction of the perforated electrode or electrodes.

127. (Withdrawn - Currently Amended) Reactor according to claim 96, in which one or more of the electrodes is such that its face exposed to the ~~filling~~ conductive lining material is provided with protuberances and/or projections.

128. (Withdrawn) Reactor according to claim 127, in which the protuberances and/or projections are such that their spacing density corresponds to more than 0.5 unit per cm^2 of electrode.

129. (Withdrawn) Reactor according to claim 127, in which the length of the protuberances and/or projections may vary between 0.001 and 0.1 times the length of the ~~filling~~ conductive lining material of the reaction chamber, and the width of these protuberances and/or these projections may vary between 0.001 and 0.1 times the diameter of the disk of the electrode.

130. (Withdrawn) Reactor according to claim 127, in which the projections are conical.

131. (Withdrawn) Reactor according to claim 130, in which the ratio between cone height and cone diameter is at least 1.

132. (Previously Presented) Reactor according to claim 96, wherein the reactor is dimensioned so as to constitute a reactor of the compact type.

133. (Withdrawn - Currently Amended) Electrical process for gas reforming comprising allowing the gas to be reformed to react in the presence of at least one oxidizing gas, in an ~~electrical~~ electrically assisted catalytic ohmic heating reforming reactor comprising at least one possibly substituted hydrocarbon, and/or at least one possibly substituted organic compound, containing carbon atoms and hydrogen as well as at least one heteroatom, in the presence of an oxidizing gas;

said electrically assisted catalytic ohmic heating reactor including:

- an enclosure;
- a reaction chamber provided with at least two electrodes and disposed inside the enclosure, said reaction chamber comprising at least one conductive ~~filling~~ lining material which defines as a whole or in part a reforming catalyst, the conductive ~~filling~~ lining material being electrically insulated from a metal wall of the enclosure so as to prevent any short-circuit;
- at least one gas to be reformed supply duct;
- at least one oxidizing gas supply duct, that is distinct or not from the gas to be reformed supply duct;
- at least one reformed gas outlet; and

one electrical source adapted to power up the electrodes and result in the production of an electronic flux in the conductive ~~filling~~ lining material between the electrodes.

134-135. (Canceled)

136. (Withdrawn - Currently Amended) Electrical process according to claim 133, in which the ~~filling~~ conductive lining material of the reaction chamber is pre-heated before feeding the gas to be reformed and the oxidizing gas, at a temperature comprised between 300°C and 1500°C, under inert atmosphere.

137. (Withdrawn) Electrical process according to claim 133, in which the gas to be reformed comprises at least one compound of the group consisting of C_1 to C_{12} hydrocarbons, and having a boiling point lower than 200 °C.

138. (Withdrawn) Electrical process according to claim 137, in which the hydrocarbons are selected from the group consisting of the compounds: methane, ethane, propane, butane, pentane, hexane, heptane, octane, nonane, decane, undecane, dodecane, each of these compounds being linear or branched.

139. (Withdrawn) Electrical process according to claim 133, in which the gas to be reformed is a natural gas.

140. (Withdrawn) Electrical process according to claim 139, in which the gas to be reformed is a natural gas initially containing less than 0.4% by vol. of sulfur.

141. (Canceled)

142. (Withdrawn) Electrical process according to claim 133, in which the gas to be reformed is a biogas, said biogas comprising 35 to 70% methane, 35 to 60% carbon dioxide, from 0 to 3 % hydrogen, from 0 to 1 % oxygen, from 0 to 3 % nitrogen, from 0 to 5 % various gases and water vapor.

143. (Withdrawn) Electrical process according to claim 133, in which the gas to be reformed is a natural gas comprising 70 to 99 % methane, 0 to 10 % ethylene, from 0 to 25 % ethane, from 0 to 10 % propane, from 0 to 8 % butane, from 0 to 5 % hydrogen, from 0 to 2 % carbon monoxide, from 0 to 2 % oxygen, from 0 to 15 % nitrogen, from 0 to 10 % carbon dioxide, from 0 to 2 % water, from 0 to 3 % of one or more C_5 to C_{12} hydrocarbons and traces of other gases.

144. (Withdrawn) Electrical process according to claim 133, in which the oxidizing gas consists of at least one gas selected from the group consisting of carbon dioxide, carbon monoxide, water, oxygen, nitrogen oxides, and mixtures of at least two of these components.

145. (Withdrawn) Electrical process according to claim 133, in which the gas to be reformed comprises at least one of the compounds of the group consisting of organic compounds of molecular structure whose constituents are carbon and hydrogen, as well as one or more heteroatoms such as oxygen and nitrogen, which comprise one or more functional groups selected from the group consisting of alcohols, ethers, ether-oxides, phenols, aldehydes, ketones, acids, amines, amides, nitriles, esters, oxides, oximes and having a boiling point lower than 200 °C.

146. (Withdrawn) Process according to claim 145, in which the organic compounds are methanol and/or ethanol.

147. (Withdrawn) Electrical process according to claim 133, in which the gas to be reformed may also contain one or more gases selected from the group consisting of hydrogen, nitrogen, oxygen, water vapor, carbon monoxide, carbon dioxide, and inert gases from group VIIIA of the periodic table (CAS numbering).

148. (Withdrawn) Process according to claim 133, in which the mixture of gases supplied to the reaction chamber contains less than 5 volume % of oxygen.

149. (Withdrawn) Electrical process according to claim 133, in which the mixture of gas to be reformed and oxidizing gas comprises 25 to 60 % methane, from 0 to 75 % water vapor and from 0 to 75 % carbon dioxide.

150. (Withdrawn) Electrical process according to claim 149, in which the mixture of gas to be reformed and of oxidizing gas comprises about 39.0 % methane, and the oxidizing gas consists of about 49.0 % water vapor and about 12.0 % carbon dioxide.

151. (Withdrawn) Electrical process according to claim 133, in which the carbon/oxygen atomic molar ratio in the gas mixture that is fed into the reaction chamber is comprised between 0.2 and 1.0.

152. (Withdrawn) Electrical process according to claim 133, in which the electrodes are powered up by using an alternating (AC) or direct (DC) current that is modulated as a function of the level of temperature to be maintained in the reactor.

153. (Withdrawn - Currently Amended) Electrical process according to claim 133, in which the ~~filling~~ conductive lining material is heated to a temperature between 300 and 1500 °C.

154. (Withdrawn) Electrical process according to claim 133, in which is carried out at a pressure in the reaction chamber that is higher than 0.001 atmosphere.

155. (Withdrawn) Electrical process according to claim 154, in which the pressure profile is maintained constant in the reaction chamber during reforming.

156. (Withdrawn) Electrical process according to claim 133, wherein the process is continuous.

157. (Withdrawn - Currently Amended) Electrical process according to claim 133, in which the reforming reaction is catalyzed with jumping micro-arcs between the particles of the ~~filling~~ conductive lining material or with activated sites at the surface of the particles of ~~filling~~ conductive lining material, through accumulation of charges and/or by passing an electrical current.

158. (Withdrawn) Electrical process according to claim 133, wherein the process is carried out in batch for periods of at least 30 minutes.

159. (Withdrawn - Currently Amended) Electrical process according to claim 158, in which the ~~filling~~ conductive lining material is replaced between two periods of implementation.

160. (Withdrawn - Currently Amended) Electrical process according to claim 133, in which the conductive ~~filling~~ lining material has a porosity index comprised between 0.50 and 0.98.

161. (Withdrawn) Electrical process according to claim 133, in which the time of residence of the reactants is more than 0.1 second.

162. (Withdrawn) Electrical process according to claim 133, in which at least one of the electrodes has perforations that are uniformly distributed with a density that corresponds to at most 100,000 openings per cm^2 of electrode surface and said openings are such that the loss of charge due to passage of gas through the electrode or electrodes is not in excess of 0.1 atmosphere.

163-167. (Canceled)

168. (Withdrawn) Use of one or more electrical reactors according to claim 96, for:

(i) the production of synthesis gas used for example for the production of methanol;

(ii) valorizing energy and/or chemical products derived from biogas produced in sanitary burying sites;

(iii) producing hydrogen for fuel applications associated with highway transportation; and

(iv) producing hydrogen for portable or stationary applications.

169. (Withdrawn) Electrical process according to claim 133, used for:

(i) the production of synthesis gas used for example in the production of methanol;

(ii) valorizing energy and/or chemical products derived from biogas produced in sanitary burying sites;

(iii) producing hydrogen for fuel applications associated with highway transportation; and

(iv) producing hydrogen for so-called portable or stationary applications.

170. (Withdrawn) Use of the process according to claim 133, for desulfuring sulfur containing gases.

171. (Withdrawn - Currently Amended) Chemically active conductive ~~filling~~ lining material for a reaction chamber,

wherein the ~~filling~~ conductive lining material is adapted for catalytic reforming, in the presence of an oxidizing gas, a gas comprising at least one hydrocarbon, and/or at least one organic compound, containing carbon and hydrogen atoms as well as at least one heteroatom;

said ~~filling~~ conductive lining material consisting of unitary elements, based on intermetallic compounds and/or their oxides, and wherein said unitary elements are adapted, when the ~~filling~~ conductive lining material is disposed in a reaction chamber, to be subject to an electrical current,

wherein the ~~filling~~ conductive lining material is adapted to be electrically insulated from a metal wall of an enclosure of a reaction chamber so as to prevent any short-circuit.

172. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 171, in which the intermetallic compounds are selected from the group consisting of elements of group VIII of the periodic table (CAS numbering) and alloys thereof containing at least one of said elements.

173. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 171, in which the unitary elements consist of a material which, in dense state, has an electrical resistivity at 20 ºC that is comprised between 50 x 10^{-9} and 2000 x 10^{-9} ohm-m.

174. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 171, in which the unitary elements are in a form selected from the group consisting of straws, fibers, filings, frits, balls, nails, threads, filaments, wools, rods, bolts, nuts, washers, chips, powders, granules and perforated plates.

175. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 171, in which the unitary elements comprise perforated plates and the surface percentage of the perforations in the plate is comprised between 5 and 50 %.

176. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 174, in which the unitary elements that constitute the ~~filling~~ conductive lining material consist of soft steel wool.

177. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 171, in which the unitary elements of the ~~filling~~ conductive lining material are previously treated to increase at least one of the following characteristics:

a. specific surface area;

b. purity; and

c. chemical activity.

178. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 177, in which the previous treatment is a treatment with a mineral acid and/or a heat treatment.

179. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 171, consisting of fibers having a characteristic diameter comprised between 25 micrometers and 5 mm, as well as a length higher than 10 times its characteristic diameter.

180. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 171, defining a porous medium having a volume surface of more than 400 m^2 of exposed surface per m^3 of reaction chamber.

181. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 171, consisting of balls and/or threads based on at least one element of group VIII and at least one metal oxide.

182. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 171, having a porosity index comprised between 0.50 and 0.98.

183. (Withdrawn - Currently Amended) Conductive ~~filling~~ lining material according to claim 182, consisting of wool made of steel threads mixed with spherical materials.

184. (Withdrawn - Currently Amended) A component for a reaction chamber, wherein the component is adapted for catalytic reforming, in the presence of an oxidizing gas, a gas comprising at least one hydrocarbon, and/or at least one organic compound, containing carbon and hydrogen atoms as well as at least one heteroatom,

the component comprising a conductive ~~filling~~ lining material and non conductive and/or semi-conductive and/or electrically insulating materials, wherein said ~~filling~~ conductive lining material consists of unitary elements, based on intermetallic compounds and/or their oxides, wherein the unitary elements are adapted, when the component is disposed in a reaction chamber, to be subject to an electrical current

wherein the ~~filling~~ conductive lining material is adapted, when the component is disposed in a reaction chamber, to adjust the total electrical resistance of the ~~filling~~ conductive lining material.

185. (Withdrawn) In a reforming process, use of unitary elements based on intermetallic compounds and/or their oxides, simultaneously as catalyst and as heating means in their quality as electrical conductors.

186. (Withdrawn) Use of conductive unitary elements, based on intermetallic compounds and/or their oxides as catalyst in a reforming reactor according to claim 96.

187. (Withdrawn) Use according to claim 184, in which the unitary elements are in a simple geometric form.

188. (Withdrawn) Use according to claim 184, in which the unitary elements are in porous form and suitable for the catalysis of the reforming reaction and for heating reactants used in the reforming reaction.

189. (Withdrawn) Use according to claim 171, in which the unitary elements constitute a fixed bed crossed by an electronic flux.

190. (Withdrawn) Use according to claim 171, in which the unitary elements are based on iron.

191. (Previously Presented) A reactor according to claim 104, wherein said elements of group VIII are selected from the group consisting of iron, nickel, cobalt, and alloys containing at least 80% of one or more of these elements.

192. (Currently Amended) A reactor according to claim 191, wherein the ~~filling~~ conductive lining material consists of a carbon steel.